

REMARKS

Applicants have studied the Office Action dated April 28, 2005, and have made amendments to the claims. Claims 1-7 and 12-15 have been canceled without prejudice. Claims 10 and 11 have been amended. No new matter has been added. It is submitted that the application, as amended, is in condition for allowance. Reconsideration is respectfully requested.

Rejections under 35 U.S.C. § 102

Claims 1-6 and 10-15 were rejected under 35 U.S.C. § 102(b) as being anticipated by JP 2001-324234A to Hitachi Ltd. ("Hitachi Ltd."). This rejection is respectfully traversed.

Claims 1-6 and 12-15 have been canceled by this Amendment. Therefore, the 102(b) rejection with respect to claims 1-6 and 12-15 is now moot.

With respect to claims 10 and 11, the present invention provides for a compressor that is stopped for a predetermined time at any time when a heat pump system is switched from a cooling mode to a heating mode or from a heating mode to a cooling mode before a four-way valve is switched. Thus, a flow direction of a refrigerant is converted into an opposite direction to carry out the switching mode. Accordingly, a noise generated at the four-way valve during the mode switching is reduced by preventing a rapid change of the flow direction of the refrigerant in the four-way valve by stopping the compressor for the predetermined time.

Hitachi Ltd. discloses a heat-pump type heat feeder comprising a compressor (1), a four-way valve (2), a first heat exchanger (3), a second heat exchanger (5), two pressure sensors (7, 8) which sense a discharge pressure and an intake pressure of the compressor, and controlling means (9) which controls the four-way valve (2). Hitachi Ltd. teaches that the flow direction of the refrigerant is converted only when the differential pressure Δp between the intake and the discharge pressure of the compressor is within a proper range. Otherwise, the discharge capacity of the compressor is controlled to increase or decrease the differential pressure Δp when the differential pressure is not within the proper range.

Due to the controlling means (9) and two pressure sensors (7, 8), the four-way valve of Hitachi Ltd. is switched to convert the flow direction of the refrigerant only when the differential pressure Δp is within 0.035 MPa to 0.075 MPa, and is not switched when the differential pressure Δp is higher than 0.075 MPa or lower than 0.035 MPa. Because the four-way valve (2) is not switched when the differential pressure Δp is higher than 0.075 MPa, crack and damage of the four-way valve (2) is prevented. Moreover, because the four-way valve (2) is not

switched when the differential pressure Δp is lower than 0.035 MPa, the four-way valve (2) is prevented from being stopped at a mid-position of the valve spool.

The compressor of Hitachi Ltd. becomes stopped when the differential pressure Δp is not within the proper range, although the discharge capacity of the compressor is changed by the controlling means to increase or decrease the differential pressure Δp . If a predetermined time passes from the stoppage of the compressor, re-operation is resumed and operation will continue if the differential pressure Δp becomes higher than 0.02 MPa.

In contrast, the heat-pump system of the present invention stops the compressor at any time when the mode is switched, and controls the four-way valve to convert the flow direction of the refrigerant after the predetermined time is elapsed from the stoppage of the compressor. This reduces the noise generated at the four-way valve by reducing the flow speed of the refrigerant.

Hitachi Ltd. teaches measuring the differential pressure Δp between the intake and discharge pressure of the compressor, controlling the four-way valve to convert the flow direction of the refrigerant only when the differential pressure is within the proper range, and stopping the compressor only when the differential pressure does not enter into the proper range. The stoppage of the compressor is carried out in order for the heat pump system to be re-operated in a normal state. Thus, contrary to the present invention, the stoppage of the compressor of Hitachi Ltd has no direct correlation with switching the four-way valve for reducing the noise generated at the four-way valve.

In view of this, it is respectfully requested that Hitachi Ltd. does not teach or suggest the invention of claims 10 and 11. Accordingly, it is respectfully requested that claims 10 and 11 be allowed.

Allowable Subject Matter

Claims 8 and 9 were allowed by the Examiner. Applicants wish to thank the Examiner for such allowance.

CONCLUSION

In light of the above remarks, Applicants submit that the present Amendment places all claims of the present application in condition for allowance. Reconsideration of the application, as amended, is requested.

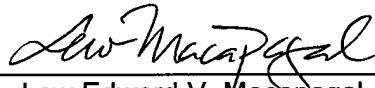
No amendment made was related to the statutory requirements of patentability unless expressly stated herein; and no amendment made was for the purpose of narrowing the scope of any claim, unless Applicant has argued herein that such amendment was made to distinguish over a particular reference or combination of references.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California, telephone number (213) 623-2221 to discuss the steps necessary for placing the application in condition for allowance.

Respectfully submitted,

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